Session 4: The Future

S H James

Department of Botany, University of Western Australia, Nedlands WA 6009

This session juxtaposed optimism with a sombre realism, if not pessimism. The optimism derives from the promise and achievements of modern technological capabilities and focussed research. The darker view is generated by a global, but rational, view of the magnitude and permeance of the changes in plant communities wrought by dieback diseases and the robustness of the social and economic imperatives which are promoting the spread of those diseases.

Giles Hardy *et al.* presented a broad overview of the current and possible options for the control of plant pathogens in native plant communities. They emphasised the great difference between the vastly diverse natural ecosystems and the monocultures of commercial plant production which provide essentially all our experience in plant disease control, the importance of ecological imbalance in the generation of disease, and the fact that almost every human activity in our native ecosystems promotes imbalance. While phosphorous acid treatment is dramatically effective in mobilising defence responses in certain species otherwise susceptible to *P. cinnamomi*, the general levels of phytotoxicity of this and other chemical controlling measures, and their effects on micro-organisms antagonistic to the pathogen, or otherwise beneficial, are not known. Untargeted chemical application, as per aerial spraying or soil drenching, is potentially capable of inducing deleterious ecosystemic imbalance. Infecting host plants with avirulent or hypovirulent pathogens may increase their resistance to virulent pathogens without any significant perturbation of the ecosystem. It should be possible to construct appropriate hypo-virulent pathogens using ds-RNA elements. Breeding, or selecting, resistant strains of host plants is a demonstrated possibility and there is little doubt that genetically-engineered, resistant hosts will be constructed in the near future. However, the scope for using targeted chemical and biological protectants, and selected or engineered stock is limited because of the cost, the area of bushland infected, and the number of susceptible species involved. Hardy *et al.* also described the sophisticated techniques now available for detecting and accurately identifying pathogens including immunological and DNA based procedures. The paper also reviewed the management procedures which are currently practised, including hazard rating and risk assessment, hygiene practice and quarantine, and outlined the variable expression of *P. cinnamomi*, and other pathogens, with varying ecological conditions.

Jen McComb *et al.* reported a series of studies which show convincingly that resistance of jarrah to *P. cinnamomi* is genetically determined, that their selected resistant stocks are indeed resistant, and that the selected susceptible stocks are indeed susceptible to *P. cinnamomi* when grown in rehabilitated bauxite mine pits. They posed and provided answers to several relevant questions: re-establishment of jarrah in graveyard sites seems possible, but has not yet been accomplished; the technique of selection for resistance and micro propagation could be adapted to any species, but the cost and work involved makes it an option only for selected priority species; the resistant and susceptible stocks available may provide the pedigreed stocks necessary for the detection of molecular markers for *P. cinnamomi* resistance in jarrah; appropriate techniques for introducing genetically engineered resistance into native species in natural ecosystems are presently not in hand and might be subject to public resistance on ethical grounds.

Greg Keighery *et al.* pointed out that the rates of change in Western Australian ecosystems had been dramatically increased since European settlement. Plant disease is but one, albeit extremely important, determinant of ecosystem change, but when associated with the synergism of broadacre land clearing, weeds and arrays of animals utilizing those plants, the change becomes permanent destruction. Rare species which are disease-susceptible and associated with remnant vegetation are fatally threatened. Their remnant ecosystems are often targeted for activities which promote the spread of disease, such as waste disposal and power-line construction. There is likely to be no source for post disease recolonization of remnants in broadacre cleared agricultural areas. A continuing remnantization of native plant communities will promote increasing levels of extinction. Disease within larger continuous areas of native vegetation will promote extinction of susceptible species and domination by fewer resistant species. Stemming this tide of extinction is perhaps the greatest challenge to land management.

Joanna Young emphasised the rapidity and magnitude of change in our plant communities associated with repeated disturbance and human exploitation. Disease may strongly exacerbate these changes, and our experience of disease control in agricultural plant production is not appropriate for disease control in complex natural ecosystems. Young is of the opinion that management must be more strongly aligned with the ecological principles which underly the relative stability of the natural ecosystem rather than being driven by human economic considerations. The natural plant communities and ecosystems of the south-west of Western Australia are diminishing, and will be less available to fewer people in future generations. Our loss can be limited only be management procedures specifically targeted at preservation and protection from disease.

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